Informal Education through Signage in Zoological Parks

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by

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Abstract

Acting as museums, zoos have been an influential and essential aspect of communities throughout the past hundred years. Zoos are unique centers that provide education, entertainment, conservation, and opportunities for research. Zoo education, which is primarily free-choice and informal because guests can choose what they would like to learn, comes in many different forms. One of the most prominent and important types of education in the zoo is the zoo sign. The analysis of Midwestern zoos' signs paired with sign research provides interesting insights into what visitors expect, desire, and learn from zoo signs. This analysis allowed me to create my own signs that would please and educate the average visitor.

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Introduction

The Cincinnati Zoo has an interactive sign that engages visitors and encourages them to learn in an indirect way. The sign has a couple of types of shoes—some have Velcro, others have laces. Immediately the sign draws the visitor in because it is unique and it does not seem to connect with the zoo so they are curious as to why it is there. The sign encourages the visitor to tie the shoes without using their thumbs to understand how other primates would tie the shoe. It is a fun way to connect visitors with the animals around them. Many visitors, particularly children and their parents, interact with this sign. They enjoy the challenge associated with it. The sign allows visitors to interact with both the sign and with each other.

In contrast, the Detroit Zoo introduced a newly designed beaver exhibit in the past year. There are many signs at the exhibit; some explain the basics of beavers and others are more in-depth and related to conservation. Beavers are native to the Midwest, so the signage would have been a great opportunity to inform visitors about their local environment and animals that are found in their own backyard. However, the Detroit Zoo decided to present this information in a poor way. The small exhibit has far too many signs. Each sign is full of information and pictures. The headlines use Chiller font that is not only unprofessional but also rather unattractive because it is associated with horror films and can be difficult to read. The differences in these signs dramatically affected my zoo experience. They changed the way I was willing to learn at the zoo. These signs also changed my perspective of the zoo in its entirety.

Through my research at the Indianapolis Zoo, Fort Wayne Children's Zoo, Lincoln Park Zoo, Brookfield Zoo, Cincinnati Zoo, Toledo Zoo, and Detroit Zoo, I discovered that zoos have dramatically evolved from their origins. Now, zoos are important community centers that provide many opportunities for learning and entertainment. As museums, zoos also focus on

conservation of their artifacts. The signage at zoos provides a platform for visitors to gain knowledge and to become captivated by the animals within the zoo. This research has helped me to create signs that would appeal to visitors and encourage them to discover more.

Defining Museums

The American Association of Museums defines a museum as "a non-profit making, permanent institution in the service of society and of its development, and open to the public, which acquires, conserves, researches, communicates, and exhibits for the purposes of study, education, and enjoyment, material evidence of people and their environment" (as cited in Alexander and Alexander, 2008, p. 2). There are many types of museums including art museums, natural history museums, science centers, history museums, children's museums, botanical gardens, and zoos (Alexander & Alexander, 2008, p. vii). Although these museums differ greatly in purpose, they have a great deal in common. First, museums are closed and secure. They provide an immersive experience separate from the rest of the world in which individuals can feel safe to learn and interact with the collection. Museums use artifacts to create a sense of awe, picture perfect moments, and generate emotional experiences in the visitor. Some museums are family centered, others involve personal reflection, but all are social experiences. Each type of museum seeks to make the visitor think deeper and reflect on important values in his life (Balloffet, Courvoisier, & Lagier, 2014, p. 10). Because visitors come to the museum with different perspectives and experiences, each visit to a museum is unique to every visitor (Wolins, Jensen, & Ulzheimer, 1992, p. 17). Museums are continually places that highlight personal experience rather than the standardized life that has become so customary to us (Gippoliti, 2011, p. 174). Most importantly, museums are key attractions that positively affect a city or region

because each museum is unique and provides a social experience that can only be found in one particular place (Balloffet et al., 2014, p. 4).

Many wonder how a zoo can be considered a museum. Individuals associate the word museum with a single building, which informs guests about the past using various artifacts. Typically, a zoo is an outdoor area for recreation and entertainment. However, the definition of a zoo is "an establishment that maintains a collection of wild animals, typically in a park or gardens, for study, conservation, or display to the public" ("Zoo," n.d.). Although animals are not static and are alive, they are still able to be collected. The zoo then puts these collections on display for the public so that the public can learn from the museum experience. The animals at the zoo elicit emotional and personal responses from visitors. Zoos provide a safe environment for the public to be social with one another and the staff available. Zoos are also important attractions, as there are only a few accredited zoos per state. Therefore, zoos are a type of museum.

Nevertheless, there are many differences between more traditional museums and zoos. The first, and most obvious difference between zoos and traditional museums, is that the zoo's collection is comprised of the living rather than the non-animate. Art museums, natural history museums, and history museums are collections of human artifacts. These artifacts are not alive like the animals in a zoo. Art museums and history museums consist of man-made artifacts and represent a particular culture or human experience. Natural history museums are more similar to the zoo in that they represent nature but the nature represented is not alive. The presentation of artifacts, particularly those created by man, has a very different feel than the presentation of live animals. Although one can study the artifacts and spend time looking in detail at them, one

cannot necessarily watch them. Animals have a personality that can draw visitors in and make the experience more relaxed and exciting. A traditional museum relies on the visitor to have some interest in the artifact. The experience in these institutions is more reserved.

Another difference is that traditional museums, particularly art museums, tend to attract people who are college-educated. Therefore, the public typically views traditional museums as temples. Although zoos are temples because of some of their original, ornate buildings, they are more relaxed and more in line with popular culture (Balloffet et al., 2014, p. 7). The art museum is the most temple-like and is rarely fun and inviting. Art museums are often very grand with guards in every room watching the collection and watching the visitors. Signage there can be very dry and educational. Signs often contain a great deal of jargon, like the terms that describe various movements and artistic motifs, including the word contrapposto. One cannot assume that the average person knows these terms and sometimes labels fail to define them properly. E.W. Eisner, a professor of art at Stanford, states that with the inclusion of information that is factual, conceptually dense, and that is difficult to assimilate, curators appear to write art museum signs for other curators, rather than the average visitor. (1988, p. 13-14).

Some museums develop signs that do appeal to the average person with little or no prior knowledge of art. The Indianapolis Museum of Art's special exhibition in the summer of 2014, *Face to Face: The Neo-Impressionist Portrait, 1886-1904*, included signage about pointillism and how, in pointillism, the contrasting colors make a scene. On one sign, they had a large color wheel that explained complementary colors. It then showed visitors the effect of putting these colors next to one another. Another example of an engaging interactive in an art museum is "The Infinite Museum" website application at the David Owsley Museum of Art at Ball State

University. This application allows visitors to look at art in new and creative ways while still learning about the history and techniques behind the creation of the art. "The ibis was highly regarded in Ancient Egyptian culture. Today, these birds no longer exist in Egypt. Do you think their extinction should be factored into the artwork's value?" is a prompt that this website includes. This prompt asks visitors to analyze the work by presenting the visitor with history and a modern day fact. These are good, but relatively rare examples of interpretative signage used in an art museum.

The most interactive of all museums are children's museums and science museums. There, each exhibit provides an interactive experience. Some exhibits may allow visitors to play with instruments and see how their actions affect sound; others may provide lights with prisms so that visitors can learn how prisms work. The visitor can interact directly with their environment in many different ways with information geared towards children and those in a family group. The environment is fun and entertaining, yet still educational.

Although the various types of museums provide visitors with incredibly different experiences, each establishment provides the community with a center for education, entertainment, and conservation.

Zoo History

For thousands of years, people have been collecting animals because of the fascination associated with exotic creatures. The first known collection of exotic animals, a menagerie, was in Ur, a city-state in Ancient Mesopotamia, about 4300 years ago (Hancocks, 2001, p. 7). Menageries existed throughout the years and were good indicators of a high status (Ritvo, 1987, p. 217). Although menageries were very grand and exotic, they were not humane (Hancocks,

2001, p. 36). Cages were very small, to the point where animals could not even turn around. Animals were often fed incorrectly, did not receive proper veterinary care, and were kept in chains. Lack of knowledge about animals contributed to these conditions, as did the idea that exotic animals kept in chains and cages represented triumph and power over the wild. Unlike the present-day zoo, the main goal of the menagerie was entertainment. Owners would allow visitors to perform unsafe acts such as putting their head into a lion's mouth (Ritvo, 1987, p.219).

As appreciation for animals grew, the goals and accessibility of menageries expanded. The creation of the first modern zoo took place during 1752 in Vienna. This was the first truly public zoo and it was used primarily for entertainment. The creation of the Zoological Society of London was in 1826. The zoo's purpose was for research and knowledge rather than just for entertainment (Alexander & Alexander, 2008, p. 153). The first zoos were incredibly similar to menageries. Cages remained small and sterile and the zoos continued to collect only exotic species. Because of the lack of medical knowledge, the sterile environment prolonged the animal's lives as much as possible (Hopson, 1976, p. 107). Although this may increase their lifespan, most animals could barely move within their exhibit. Zoo staff isolated animals and did not allow interaction with anything from the animals' natural environment (Turkowski, 1972, p. 468). If an animal died, the zoo would replace the animal with another from the wild as breeding was not an important aspect of original zoos. Typically, animals were arranged by phylogenetic features. Therefore, zoos would house all big cats together. Similar groupings such as pachyderms, primates, and reptiles would also have their own buildings.

As zoos became more popular and animal welfare became more important, zoos began to expand their exhibit size. Between 1902 and 1907, Carl Hagenbeck, a German merchant who

specialized in selling exotic animals, created mountainous terrain exhibits with moats allowing the exhibits to be cage free (Alexander & Alexander, 2008, p. 154). Although these exhibits were made mostly of concrete, they were still an improvement because animals could move more freely throughout them. With the introduction of the Endangered Species Act of 1973 in the United States, these concrete tanks became habitats with more naturalistic materials and features (Cain & Meritt Jr., 1998, p. 298). As time continued, education became increasingly important in zoos. Interpretative signage and immersive exhibits emerged more frequently. Most recently, conservation has become a key point in the zoo world. Zoo staff and visitors alike have begun to realize that the animals in a zoo collection are ambassadors for the species. Therefore, the zoo world is highlighting conservation efforts. The idea that visitors rarely want to feel like they are standing in front of prisoners has helped zoos to become what they are today (Andersen, 1991, p. 4). Zoos have finally become what Emperor Wen Wang, before 1000 BCE, imagined when he called his own menagerie the Garden of Intelligence (Hopson, 1976, p. 108). Finally, zoos are more than just entertainment and are now centers for education and conservation, as well.

Zoo Goals

The modern day has three primary goals: entertainment, conservation, and education. Some individuals also consider research an additional goal (Anderson, 2003, p. 827). Entertainment is essential to include because most zoos receive their primary funding from admission and merchandise sales. Many zoos incorporate rides into the experience. Some zoos have roller coasters, while others have movies. One of the best ways zoos weave entertainment into the visitor experience is by providing hands-on animal experiences. At the Indianapolis Zoo, a visitor can buy some bird food glued to a stick for $3.00 and interact with the budgies by

letting them eat off the stick. Because this experience connects the visitor with the animals, it is not only entertaining but it instills a sense of wonder in the visitor, which then encourages the visitor to examine the zoo's other goals of conservation and education. By using the animals in the zoo as ambassadors for their counterparts in the wild, zoos can encourage conservation. When a visitor comes to the zoo and sees just how big an elephant is, he connects with the elephant due to his amazement. When the visitor learns of the elephant's endangered status, he will want to understand how to protect the elephant and its environment. The zoo staff gains a platform through their animal ambassadors. Finally, the visitor will want to learn more about the general facts and special adaptations of the animal. Signage and keepers talks can answer such questions as, "How long does an elephant live?" Without knowing general information about an animal, the threats it faces, and the actions required to stop these threats, visitors will not take action against these dangers (Woodland Park Zoo, 2013, p. 2). The encouragement of conservation is essential to present day zoos because it takes more than habitat protection to stop extinction (Cain & Merrit Jr., 1998, p. 299). Prevention of extinction will only occur if more people are aware of the issue, fund organizations that protect species, and protect the environment. Zoo education inspires people to care about conservation by encouraging them to spend more time in nature, visit zoos, create less trash, purchase environmentally friendly products, and avoid using chemicals (Dierking et al., 2004, p. 329).

Zoo Education

It can be difficult to implement effective educational strategies in zoos because zoo education is always evolving (Pearson, Lowry, Dorrian, & Litchfield, p. 2014) as educators better understand the complex, social, and experience-based visit that guests desire (Rosenfeld,

1979, p. 15). Education in a zoo is considered free-choice learning because of the organization and intention while not being in a school setting. The definition of free-choice learning is education in a specific place that is very flexible and that focuses on the present. Free-choice learning is not traditional because it focuses on the visitor's participation by allowing them to leave at any time and choose their own objectives (Taylor, 2008, p. 24). It provides a unique obstacle for zoo educators because they have to attempt to create something open ended that a variety of individuals can value. Although zoo visitors tend to be more conservation oriented than the average person, some visitors are just coming to the zoo for a relaxing day and may be reluctant to learn (Smith, Broad, & Weller, 2008, p. 547). During a study at Brookfield Zoo (as cited in Schwan, Grajal, and Lewalter, 2014, p. 2) researchers found that only 32% of visitors come to be highly engaged by the zoo experience, while 46% are prepared to be moderately engaged, with the last 12% visiting for leisure alone. This statistic indicates that the zoo needs to find effective ways to communicate with some visitors who do not particularly care about learning. Not only do some visitors not care about learning, there are different types of visitors who approach the zoo with various perspectives. Dr. John Falk, a professor at Oregon State University, has broken down guests into several categories. The first category is the explorer, an individual who is curious and interested in animals. The second group contains professionals and hobbyists who come with a goal in mind. These visitors have experience visiting many zoos. The third category is the facilitator who is visiting with friends and family and who is visiting the zoo for a good time. The fourth type of visitor is the experience seeker, a visitor who wants to try all the unique experiences a particular zoo has to offer. The fifth and final type of visitor is the recharger who is using the zoo for relaxation purposes (as cited in Schwan et al., 2014, p. 74). These different groups provide an extra challenge for zoo educators.

In addition to there being different types of learners, people of all ages visit the zoo. As do guests with many different educational levels. Therefore, education must be simple enough that most people can understand yet complex enough that it is not boring. The social dynamic also affects how the visitor experiences the zoo. The goals of a visitor and the way that the visitor travels through the zoo will likely change depending on whether they come alone, with a friend, or with children. Finally, visitors come with different cultural backgrounds. Some may have been born on a farm and are familiar with cows, whereas others may be seeing a cow for the first time during their zoo visit. The varying demographic makes it difficult for zoo staff to target a specific individual. Therefore, the creation of programs and signage should appeal to, engage, and educate all of these groups of people (Yocco, Danter, Heimlich, Dunckel, & Myers, 2011, p. 801).

In order to accommodate this large and varied demographic, the zoo staff has created a variety of educational opportunities. Historically, zoos have focused on the use of guidebooks and signage to educate visitors (Turkowski, 1972, p. 469). The ideas covered tended to be incredibly scientific and informational. Zoos informed visitors about psychological and physical requirements that animals have, how one action influences others, and how organisms have an evolutionary history (Rabb, 1968, p. 292). These ideas are still mentioned, but educators try to present these ideas more interestingly and introduce these ideas while visitors are experiencing what they are learning and having fun (Balloffet et al., 2014, p. 5). Visitors can now learn in a variety ways. Most zoos offer on-site docents, interactive exhibits with 3D objects and animal artifacts, audio tours, and electronic kiosks where visitors can complete an activity. Animal demonstration, training within the exhibit and naturalist talks are also included so that the viewer can learn while the animal is in action (Anderson, 2003, p. 828). These forms of education are

effective because the staff can answer questions and tailor the presentation to the group he is speaking to (Oregon Coast Aquarium, 2010, p. 7). Although staff can make the learning incredibly personal, staff may not be available at all times to speak to visitors. Therefore, signs are still necessary to provide basic information to visitors when other programs are not being offered at that moment.

Zoo Signage

One of the most common forms of education is the presence of signage throughout the zoo. G.W. Sharpe notes that signage is unique because it is self-chosen, self-pacing, and self-editable (as cited in Wandersee and Clary, 2007, p. 16). Visitors can decide which labels they want to read, how much time they would like to spend per label, and which parts of the labels interest them the most. As visitors are reading and interacting with the labels, the overall viewing time of the entire exhibit will increase, making it more likely for the visitor to learn about and appreciate the animal (Chryslee, 1995, p. 21). In the zoo, a visitor can find advertisements, functional, identification, and interpretative signs. Advertisements both within the zoo, as seen in a sign at the Brookfield Zoo (Figure 1), and outside of the zoo let the public know the function of the zoo and that there is a zoo nearby. Functional signs include directional signs and signs that indicate bathrooms, guest shops, eating areas and more. Throughout most zoos there are signs stating proper zoo etiquette. The Detroit Zoo (Figure 2) posts many signs that inform visitors that they should respect the animals and the zoo environment in various ways. Identification (ID) signs are basic signs used to identify animals. These signs include general facts about the animals and typically a picture. Interpretative signs are more interactive and include more in-depth descriptions than identification signs (C. Piropato, personal communication, September 23,

2014). Signs are essential to the zoo atmosphere because they help visitors identify where they are and what they are looking at. Without signs, visitors may become confused. For example, in the Mouse House at the Bronx Zoo, there are several exhibits without signs. Many visitors are not aware of the various species of rodents and one exhibit contains several primates, so it is difficult to guess what the animal is. It can be extremely aggravating to look at animal and not know what you are looking at. The absence of signs also makes it impossible to learn more about the animal. Although some zoos employ the use of staff and volunteers to educate, the zoo must train educators well. Another issue with on-site educators is that the zoo can only provide so many educators per exhibit, and, if the educator is already conversing with one group, a different group may not be able to ask the educator questions. Because signs are so essential, zoos need to present signs in ways that are inviting and easy to read.

The process of making a sign is incredibly detailed. The first step in sign creation is determining which staff member in the zoo will create the sign. In some cases, a single individual creates the signs for the zoo. For example, the Fort Wayne Children's Zoo has an education coordinator who oversees all educational aspects of the zoo including the signage. Her position is distinct in that she not only chooses what goes on the sign but how the signs look throughout the zoo. She also does advertisements for the zoo and essentially creates the face of the zoo. However, the Fort Wayne Children's Zoo is a smaller zoo and has less revenue and a smaller need for an extensive education department. Similarly, the Toledo Zoo has a curator of graphic and exhibit design who works on the signage but does not necessarily work on other educational programs throughout the zoos. Bigger zoos may have two departments working on the signage. The Indianapolis Zoo has a conservation interpretation programs specialist who

provides content for the signs and a creative director who focuses on the design of the sign. Signs may be more varied because more than one individual creates the signage.

The next step to sign creation is deciding whether the exhibit needs a sign. If the exhibit needs a sign, Beverly Serrell, a well-known label writer and evaluator, suggests that the writer clearly relates the sign to the exhibit. Signs that are not related to the exhibit will detract the visitor from reading any sign because visitors want to learn about the exhibit in front of them. Sign placement is also an important factor to consider. The sign should be in front of the visitor, not behind or to the side (as cited in Chryslee, 1995, p. 19). A sign should not be at the entrance to the exhibit because visitors are ready to see the exhibit and will pass any signs that are placed before it (Thompson & Bitgood, 1988, p. 105). The exhibit affects whether or not the visitor reads the sign. If the exhibit is not intriguing, then visitors will not want to read more information about an animal that does not spark their interest (Andersen, 1991, p. 4). No matter what type of sign it is, the sign should be brief. In addition, the sign should be lively and personal, particularly in a zoo setting where personal reflection is harder to achieve because zoos are more social than art museums and natural history museums (Taylor & Neill, 2008, p. 29).

After deciding who will make the signage and where the sign will go, the creator will decide the materials for the construction of the sign. There are many options for sign materials such as sintra, dibond, folio, digital printing on vinyl, silk screening, 3M Scotch print, laminate, and wood (Oregon Coast Aquarium, 2010, p. 24-25). The Visayan Warty Pig identification sign at the Cincinnati Zoo (Figure 3a) is a typical sign posted on wood near the exhibit. However, some signs, such as the sign seen in a Giraffe identification sign at the Lincoln Park Zoo (Figure 3b), are printed on fabric to capture the ambiance of the exhibit. Choice of material depends on

cost, the amount of exposure to the elements, lighting, relevance to the exhibit, and the lifespan of the sign material. Because zoos are non-profit, they are often going to look for the material that is cheapest and that will last longest. Another factor the zoo must consider is how often they would like to replace the signs. Because scientific information can easily become outdated and visitors will become bored with the same signs over time, signs at zoos change frequently (S. Bray, personal communication, September 29, 2014). A bird identification sign at the Fort Wayne Children's Zoo (Figure 3c) is a simple sheet of laminated paper that guests can carry with them throughout the aviary. One of the cons to this type of sign is that visitors could easily destroy, steal, or lose the sign. However, zoo staff can easily replace and update the sign because it is made with a cheaper material. The Brookfield Zoo displays its Argus monitor identification on a tablet (Figure 3d). Recently, an increasing number of zoos are adopting electronic tablets because educators can easily update the information on a tablet. The information also moves in a loop so that a visitor is not overwhelmed by one big block of text. However, tablets are expensive, require charging, need to be indoors away from the wind and rain, and can easily be broken by a visitor. Due to the many variables, finding the perfect material can be difficult for sign creators. Creators will choose the material that best suits their needs.

Identification signs provide general information about an animal and are available to satisfy the basic curiosity of a visitor. The Bat-eared fox identification sign at the Cincinnati Zoo (Figure 4a) is a typical identification sign. It tells the visitor most of what they want to know about the bat-eared fox. Identification signs can provide a variety of short facts but zoo visitors have indicated in J. J. Fraser's (2009, p. 11-12) research at the Bronx Zoo, Monterey Bay Aquarium, Philadelphia Zoo, Shedd Aquarium, and Woodland Park Zoo that they are most interested in knowing: odd facts about a species, its endangered status, where the animal lives in

the wild, its lifespan, diet, and how heavy or tall the animal can grow. The Orinoco Crocodile identification sign at the Brookfield Zoo (Figure 4b) is a great example of a sign that contains all of this information. The sign is also large, contains easy-to-read text, and has a distinct theme making it an above average identification sign. Gestation, evolutionary relationships, and the scientific name, which are examples of more traditional information, can be included but this information does not seem to interest the average visitor because it is uninteresting and difficult to understand (Fraser, 2009, p. 11-12). Basic information such as the common name and an identification picture should be included on all identification signs. Identification signs may also contain a small section that may elaborate on a specific factoid, such as an odd fact or unique adaptation. The straw-colored fruit bat sign at Indianapolis Zoo (Figure 4c) contains some interesting facts that other identification signs may not focus on such as the fact that straw-colored fruit bats suck out the juice of a fruit then spits out the pulp. These facts are great to include because they are memorable and interesting, so guests may share what they learned with others.

Interpretative signs explain information in detail. These signs may not focus on a particular animal, but may focus on a group of animals and features they share, a habitat in which animals live, or include information about cultures in specific areas where one would find the species. These signs are for the visitor who wants to learn more. Because interpretative signs are additional signs, the sign must have an attractive feature. This feature can be a question to pique the visitor's interest, a story for the visitor to get involved in, large pictures, or a fun interactive aspect (Balloffet et al., 2014, p. 8).

Interpretative signs cover a wide variety of topics. One of the most common interpretative signs is that which explains why an animal is part of a particular class as seen in the Amphibian interpretative sign at the Detroit Zoo (Figure 5). This sign explains to visitors the characteristics of the class Amphibia along with the various animals that one will find in the class and within the entire exhibit. To explain why an animal is in a particular class or family, the exhibit may include signs that discuss specific adaptations of various animals or animal groups. Feathers, an adaptation unique to the class Aves, are incredibly intricate. Many visitors may wonder about the function and form of feathers. Therefore, some zoos include signs that describe feathers. The Cincinnati Zoo has an interpretative sign that describe this adaptation (Figure 6a). The Toledo Zoo also has a sign that explains a particular adaptation. This sign discusses beaks (Figure 6b). It is particularly well made because it compares animal adaptations to objects we use in everyday life. This sign will help visitors connect to the animals by creating a relationship between the objects visitors use daily and the exotic animals on display. Creating this relationship helps visitors better understand how the various beaks function. The Indianapolis Zoo also has many interpretative signs. Several signs in the Desert Biome (Figure 6c) focus on how plants in a particular habitat have adapted in order to live with the animals on exhibit. Adaptation related interactive signs are common. They help to further immerse the visitors into the environment and understand the animals' natural habitat and behaviors.

Comparative interpretative signs are also becoming popular in zoos. Zoos are encouraging guests to make connections and to compare animals that are similar but not identical. Brookfield Zoo has many interpretative signs for their wolf exhibit, including Figure 7, which compares the gray wolf, coyote, red fox, and German shepherd. Many visitors are already aware of German shepherds. Using German shepherds as a foundation for the knowledge will

help visitors when comparing the wolves and other canines. The information on this sign can help visitors while identifying wildlife and in the general understanding of the animals' bodies.

Natural behaviors are also important topics for interpretative signs. Not only do these signs teach the visitors about the species, if a visitor is confused about the behavior an animal is displaying, they can refer to the sign for explanation. A wolf behavior interpretative sign at Brookfield Zoo (Figure 8a) explains most of the interactions and emotions a visitor may see while watching the wolves. The Fort Wayne Children's Zoo has a similar sign regarding zebras (Figure 8b). This sign explains how tail placement and ear placement are important to observe along with other distinct zebra behaviors. These signs are necessary because both wolves and zebras are group animals and display distinctive pack behaviors. Along with natural behaviors, basic biological concepts are also common topics in interpretative signs. The Lincoln Park Zoo has many signs that focus on basic concepts such as the food chain interpretative sign (Figure 9). This particular sign explains to visitors the idea of a food chain while including the animals on display.

As conservation is one of the three main goals established by zoos, many interpretative signs cover this topic. Conservation is a multi-layered concept. First, the animal must interest the visitor. Then, the visitor will want to learn basic facts about the animal. After learning the basic facts, visitors need to be compelled to care about the particular animal. Hopefully these interactions will encourage the visitor to have a positive emotional response towards the animal. After the creation of an emotional response, the visitor needs to learn how they can help in the conservation process. The frog conservation interpretative sign at Brookfield Zoo envelops this entire process (Figure 10a). The amphibian and reptile house contains this sign. Visitors walk in

and are able to look at all of the fascinating frogs. They then learn about the frogs by through reading identification signs. They then come upon this sign where they learn about the frogs' endangered status; visitors then learn how they can help frogs. This sign provides both the problem and the solution. One conservation sign at Fort Wayne Children's Zoo (Figure 10b) is more proactive than the frog conservation sign at Brookfield Zoo. Upon entering the zoo, the visitor receives a token that he can put into the bucket for the animal he would like to help conserve in the wild. However, the visitor will not see the animals he is working to conserve before placing the token into the bucket. Even without seeing the animals, this is a fun sign for children and provides a great teaching opportunity for parents and school groups.

Signs that feature a look behind the scenes are incredibly unique and uncommon in zoos. Many visitors do not know the exact layout of an exhibit, the reasons behind particular exhibit features, and the daily duties of zookeepers. Toledo Zoo has a variety of these signs. One particular sign (Figure 11a) shows the layout of the exhibit that visitors are currently in. It not only informs visitors about what they are looking at, it also informs them about the habits of the polar bear and the parts of the exhibit that the visitors may not be able to see. These signs can be very interesting and insightful, particularly to those interested in zoo careers. Other signs that can be interesting for those who are looking to be in a zoo career or those who are interested in animal welfare are signs focusing on enrichment. The Brookfield Zoo has a good example of this type of sign (Figure 11b). Enrichment is a daily task for many keepers and is important to keep animals entertained and active. However, many visitors are unaware of the enrichment that zookeepers introduce daily. This sign gives a behind the scenes look at what the keepers do. It may also answer some questions as to why certain animals may have balls or blankets in their exhibits.

In order to connect people with animals, zoos began to connect visitors with cultures found near particular animals' habitats. The Toledo Zoo has a cultural interpretative sign (Figure 12a) that shows various ethnic groups including the Inuit, Nenets, Inupiaq, Chukchi, and Saami, who live in the north beside the polar bears and various pinnipeds. The sign gives interesting information about these peoples' ways of life. They show how different individuals outside of the Midwest behave and how those individuals live alongside the wild animals visitors are seeing in the zoo. A different sign at the Toledo Zoo tells a folktale found in the Swahili culture about the creation of the hippo (Figure 12b). This sign is good to include because it shows how different cultures view the hippo.

Although the types of signs have remained the same throughout more recent zoo history, there is a definite push towards more attractive designs. Figure 13a shows an older identification sign for the Binturong and Figure 13b shows a newer version of that sign, both of these signs are at the Detroit Zoo. These signs are incredibly different looking. Both contain about the same amount of information but the newer sign is much more attractive. The sign has brighter colors, a real picture of the animal, and better writing. The sign is more descriptive and includes facts that are well developed.

Interactive signs are also becoming more popular throughout zoos. They are especially attractive to visitors who would rather experience than read. Interactive signage helps produce a positive response, increases exhibit use, and increases retention (Peterson, 1991, p. 11). Some interactive signs are quite simple, such as a scavenger hunt sign that encourages visitors to find animal tracks throughout the zoo (Kramer & Gwynne, 1991, p. 9). Others are even simpler such as shells, nests, and tools. A snake skull interactive sign at the Indianapolis Zoo (Figure 14a) is

simple yet effective. The visitor can open and close the skull in this sign by using the crank on the side. This sign enlarges a snake's skull so the visitor can better understand the skull's structure and movement. These 3D interactive objects are simple, direct, and appropriate (Peterson, 1991, p. 11). An interactive sign about bird feet at the Indianapolis Zoo (Figure 14b) includes flip panels with questions and answers. Flip signs are also a very popular type of interactive signage (Korn, 1987, p. 15). They are easy to produce and can handle the wear and tear of being touched by many visitors. Another very simple use of an interactive is letting the visitor compare himself to an animal. At a sign in the Cincinnati Zoo (Figure 14c), the visitor can stand and hold his arms out and see which bird's wingspan he has. These signs are great for children and can help the visitor understand just how big or small an animal is.

Another fun way to connect visitors with the animals in front of them is by including signs that introduce the individual animals to the public. Visitors tend to be interested in learning the story behind the animals they see. Figures 15a and 15b include information about the tigers on exhibit at the Detroit Zoo and the Fort Wayne Children's Zoo. These signs present the age, gender, and names of these animals. They create an entirely different personal experience allowing guests to connect with the animals at the zoo closer to the way that they connect with the animals in their homes (C. Piropato, personal communication, September 23, 2014).

Signs come in all shapes and sizes. Some are larger than others, and some include more information. Charismatic mega fauna (bears, big cats, great apes, and elephants) tend to have larger and more extensive signs (as cited in Woodland Park Zoo, 2013, p. 2). Not only are these animals typically more interesting to visitors, they are bigger and there is more space at their exhibits for signs (C. Piropato, personal communication, September 23, 2014). Smaller animals,

particularly those in mixed-species exhibits, have individual species signs that contain just the common name, scientific name, and occasionally the ranges. Examples of these can be found in at the poison frog exhibit at the Brookfield Zoo (Figure 16a), an aviary at the Brookfield Zoo (Figure 16b), and in the aquarium at the Brookfield Zoo (Figure 16c). Not only do these exhibits lack the wall space to highlight each species, visitors typically are not as interested in these animals. There is a definite contrast between the mixed animal exhibit signage, the polar bear interpretative sign at the Brookfield Zoo (Figure 16d), and the giraffe interpretative sign at Brookfield Zoo (Figure 16e). Figures 16f and 16e are signs for charismatic mega fauna. Visitors come to the zoo primarily to see these animals. They are very large, tend to be more active, and are mammals. The exhibits are larger because the animals are larger so there is more room for signage. The signs are also a bit more engaging than the basic identification signs for amphibians, reptiles, birds, fish, and insects. The exhibits tend to be more interesting so the sign creators made signs to match that.

With the evolution of technology, zoos are introducing many new types of interactive signage. Some zoos use tablets as their identification signs. Zoos use tablets so that visitors can have more information (Ballofet et al., 2014, p. 12). At the zoo, technology is being used through voice-guided tour systems, video kiosks, and electronic interactive experiences such as games, digital recording and playback, which can be found at the Cincinnati Zoo (Figure 17a), and quizzes. A frog call interactive sign at the Detroit Zoo (Figure 17b) teaches children about the frogs in their backyard by giving them the opportunity to push a button and hear the frogs' calls. The sign itself contains many pictures and bright colors so a visitor is immediately attracted to it. It is simple yet enjoyable. Many visitors enjoy this use of technology. They feel as if this information is more likely to be up to date (Yocco et al., 2011, p. 806). The interactive signage

engages visitors and gives them an experience. While doing a task on an electronic interactive, a visitor is more likely to remember what he learned than if he had just read the sign (White, Marcellini, & Barry, 1986, p. 4). A sign at the Cincinnati Zoo (Figure 17c) is a strong example of a sign where the visitors are encouraged to perform an action. The visitor is encouraged to count the number of ants that passes a certain area during a specific time period. This interactive not only teaches the visitor about the ants, but teaches the visitor how to perform basic biological research. Overall, technology increases the level of participation and gives the user a better experience, which encourages him to return later (Zaharias, Michael, & Chrysanthou, 2012, p. 382). However, electronic technology has a few downfalls. First, it does not always stand up to the elements and the constant use, especially by children (Oregon Coast Aquarium, 2010, p. 8). Another issue with electronics is that many people come to the zoo to get away from technology (Yocco et al., 2011, p. 810), and computers can overshadow animals (S. Bray, personal communication, September 29, 2014).

Sign creators consider a great deal of technical information when making a sign so that visitors are more likely to read and enjoy it. Graphically, the sign should have a large engaging picture with vibrant colors. The Brookfield Zoo's lion exhibit has a good example of a sign with a large picture (Figure 18). The picture on this sign is huge, if not larger than life size. The visually stunning picture will attract visitors and will encourage them to read the sign.

Branding signs helps a visitor know where he is (Oregon Coast Aquarium, 2010, p. 8). Branding will also help with keeping the signs consistent so that a visitor can internalize the basic design, making each sign easier to read. The Detroit Zoo and Fort Wayne Children's Zoo both brand their signs well. At the Detroit Zoo, there are several signs branded in an Asian style.

(Figure 19a and Figure 19b). All of the animals found in Asia use signs that have the same color palette and print on them. The Fort Wayne Children's Zoo also does sign branding as seen in a honey badger identification sign (Figure 19c) and a hyena interpretative sign (Figure 19d). The Fort Wayne Children's Zoo's branding is not as obvious as the Detroit Zoo's branding because the Detroit Zoo uses a template and the Fort Wayne Children's Zoo does not. However, the Fort Wayne Children's Zoo used the same fonts, colors, mixture of both pictures and sketches, and similar patterns so that the visitor can identify both the hyena and honey badger as African animals.

According to Dr. Jim Wandersee and Dr. Renee Clary, co-directors of EarthScholars Research Group, a sign should be incredibly brief. It should have a maximum of 100 words and seven sentences. Each sentence should be around eight words in length. Overall, a line should have about 42 characters. Using the same vocabulary throughout a sign is encouraged in sign making to help create consistency. Creators should write signs at around an eighth grade reading level with no assumption that the reader has extensive biological knowledge. Writers should keep the passive voice under 20% and present the information in a conversational manner. One sign should have one main topic with the rest of the information pertaining to that topic (Wandersee & Clary, 2007, p. 22). If encouraging conservation, the information included should be 80% positive and 20% negative. Although visitors want to learn what is wrong, they would rather learn about success stories and their ability to help contribute to those (Oregon Coast Aquarium, 2010, p. 16). The Grand Cayman blue iguana conservation sign at the Indianapolis Zoo contains this proportion (Figure 20). The sign has a short passage about why the Grand Cayman blue iguana is disappearing then has a much longer explanation about how the Indianapolis Zoo is helping them both in situ and ex situ. Overall, the writer should be present

the information coherently and logically with scientific questions presented and interaction promoted (Wandersee & Clary, 2007, p. 22). Signs should connect the visitor with the animal, should be goal driven, and include a discussion of a particular subject rather than just a definition of it (Oregon Coast Aquarium, 2010, p. 6).

A group of signs should be multi-vocal and include many topics so that each type of visitor can find something he enjoys (Wandersee & Clary, 2007, p. 22). Because of this preference for the signs to be multi-vocal, many zoos have started taking on the challenge of storytelling. Storytelling is a unique option for signs. It appeals to different age groups and visitors who are not science oriented. It also has a stronger appeal to female guests, according to research done at the Cincinnati Zoo (S. Bray, personal communication, September 29, 2014). Zoo signage utilizes many different types of storytelling including poetry. For example, the bat-eared fox sign at the Cincinnati Zoo (Figure 21a) takes advantage of this form of writing. The signs presents the poetry in an easy to read and a fun, immersive way yet it still provides the reader with basic information about the bat-eared fox's habitat. An otter interpretative sign at the Lincoln Park Zoo (Figure 21b) also shows a short poem with pictures that are similar to a children's story to attract the younger visitors. Another way to include storytelling in zoo signage is by immersing the visitor in a story. Several signs leading up to Tropic World at the Brookfield Zoo (Figure 21c) make the visitor feel like he is a character in the story. The words prompt him to move through the exhibit and to make choices as a primate in the wild does. This connects the visitor with the animals and encourages him to learn more about the animal and about conservation of that animal.

Whether the sign is big or small, electronic or plastic, two-dimensional or three-dimensional, it needs to foster curiosity, excitement, and appreciation in the visitor (Woodland Park Zoo, 2013, p. 2). The signs need to be unexpected and connect the visitor with the animal so that conservation can occur (Wolins et al., 1992, p. 26). The creator needs to layer a sign and communicate with a variety of people in order to please as many visitors as possible (Coe, 1991, p. 9). It also needs to be able to compete with the exhibit itself (Yocco et al., 2011, p. 810), yet remain secondary to the animals (Oregon Coast Aquarium, 2010, p. 13). As Catherine Tompson the curator of education at the Baltimore Zoo explained, "If zoos want their audiences to learn to love, they must present a message that the public will love to learn" (Tompson, 1991, p. 13).

Conclusion

Overall most accredited zoos have very strong signage that addresses the visitors' needs of both entertainment and education. Nevertheless, some zoos should replace or revise certain signs. The newly renovated beaver signs at the Detroit Zoo (Figure 22a) are very unattractive. The information they contain is interesting, but there is far too much of it. The layout of the sign and the presence of more than two signs for a small exhibit is overwhelming. To change the sign, I would recommend cutting the amount of information in half. I would also recommend using a different font for headers and possibly different images. The image in the bottom left seems to be clip-art. Overall, the sign comes off as unprofessional and unappealing. The "Unusual Suspects" interpretative sign at the Toledo Zoo (Figure 22b) has a genuinely good message behind it. The factoids contain myths and negative facts associated with various species of birds. However, the animals on the sign are not to actual height, making the flamingo seem very, very large. In addition, the visitor, who rarely reads the entire sign, may just notice the overall negative

connotation the sign is associating with these birds. If I were to change the sign, I would make the birds' sizes accurate. I would also make it more obvious that this sign is dispelling negative reputations rather than encouraging them.

Most signs are effective at communicating and combining scientific information with the zoo's goals. Some of the best signs I have come across have been at the Brookfield Zoo and the Fort Wayne Children's Zoo. The cassowary identification sign at Brookfield Zoo (Figure 23a) is incredibly large, bright, and whimsical. A visitor cannot miss this sign. It contains all of the information visitors have indicated that they are interested in. Overall, this sign is visually appealing and contains just the right amount of information. The marsupial interpretative sign at the Brookfield Zoo (Figure 23b) is both attractive and informative. It contains information that most visitors are unaware of and is incredibly large. One of the best parts of this sign is its use of various media. The fabric is fun and provides some interaction for the visitor. The entire sign's shape is like a pocket, which helps to reinforce the major lesson of the sign—that marsupials have pockets. The leopard identification sign at the Fort Wayne Children's Zoo (Figure 23c) is less vibrant than the previous two signs. However, the use of images, both real and sketched is incredibly appealing. The palette matches the setting and overall feel of the exhibit. The sign highlights basic information and interesting facts. This sign would appeal to a slightly more mature audience who wants to learn more about the leopard.

Using the research I have found, I created several signs that I think would be appropriate to include in a zoo. I created two identification signs and two interpretative signs. For the identification signs, I included the facts that Fraser's research suggested. I kept the signs short and simple so that the visitor can learn the basics of the animal (Figures 24a and 24b). The first

interpretative sign I created discusses the myths associated with bats and provides facts as to why these myths are not true (Figure 24c). This sign is important to include at zoos because bats are misunderstood and are currently facing habitat endangerment. Visitors need to learn that bats are harmless creatures that they need to work to protect. My second interpretative sign discusses a specific adaptation across various species (Figure 24d). It explains why different animals have evolved to have larger than average ears.

Zoo signage should be an inspiration to more traditional museums such as art museums and natural history museums. By making their signs more vivid and relaxed, traditional museums will feel more welcoming to all types of visitors. Visitors who previously believed that a traditional museum felt sterile and dry would change their opinion if the signage were more like the signage in a zoo. Art museums could achieve this by creating more exhibits similar to *Face to Face: The Neo-Impressionist Portrait, 1886-1904*, at the Indianapolis Art Museum and "The Infinite Museum" at the David Owsley Museum of Art at Ball State University. Art museums should consider explaining terminology using simple vocabulary, humor, and storytelling. They should also use more interactive signs and include flip panels, technology, and games.

Zoo signs are a fun and practical way to enhance visitor experience and increase learning. In general, to improve the signs at zoos, zoos should consider using more technology and more interactive aspects. However, when using these, the sign creators need to remember to be concise because interactive signs can be overwhelming. Hopefully sign creators will continue to research best practices to make their signs as welcoming as possible. Zoos are succeeding at updating signs on a regular basis and making them visually appealing to visitors.

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Appendix

Figure 1. Advertisement. Brookfield Zoo.

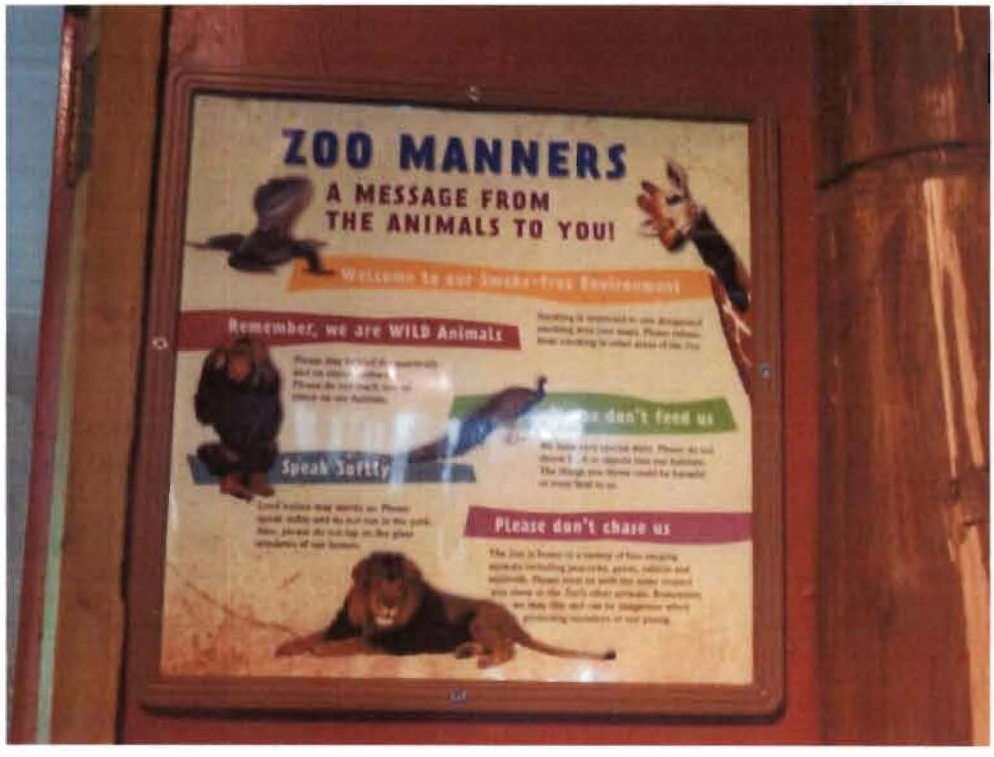


Figure 2. Functional, Zoo Manners. Detroit Zoo.

Figure 3a. Visayan Warty Pig ID sign. Cincinnati Zoo.

Figure 3b. Giraffe ID sign. Lincoln Park Zoo.

Figure 3c. Indonesian Rainforest ID sign. Fort Wayne Children's Zoo.

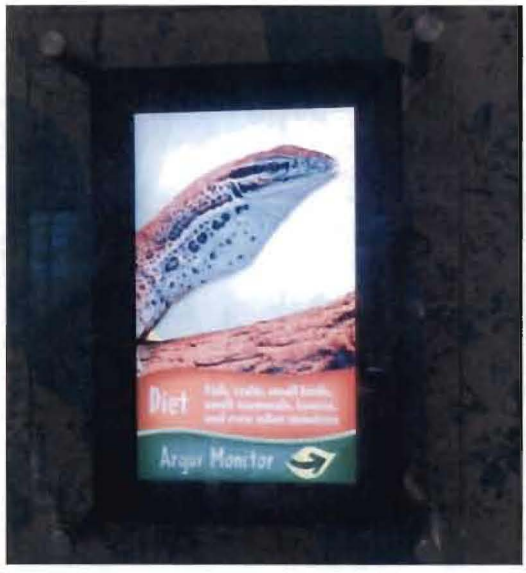


Figure 3d. Argus monitor ID sign. Brookfield Zoo.

Figure 4a. Bat-eared fox ID sign. Cincinnati Zoo.

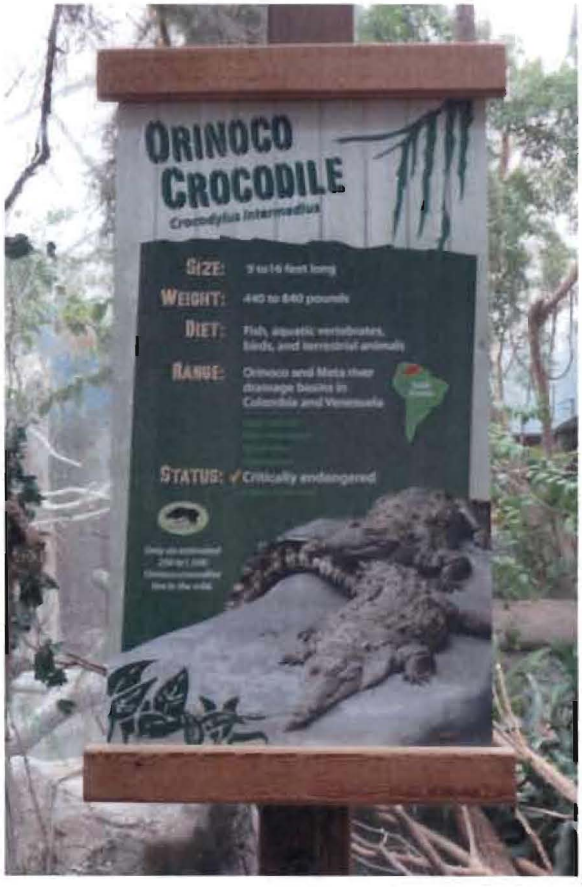


Figure 4b. Orinoco crocodile ID sign. Brookfield Zoo.

Figure 4c. Straw-colored fruit bat ID sign. Indianapolis Zoo.

Figure 5. Amphibian interpretative sign. Detroit Zoo.

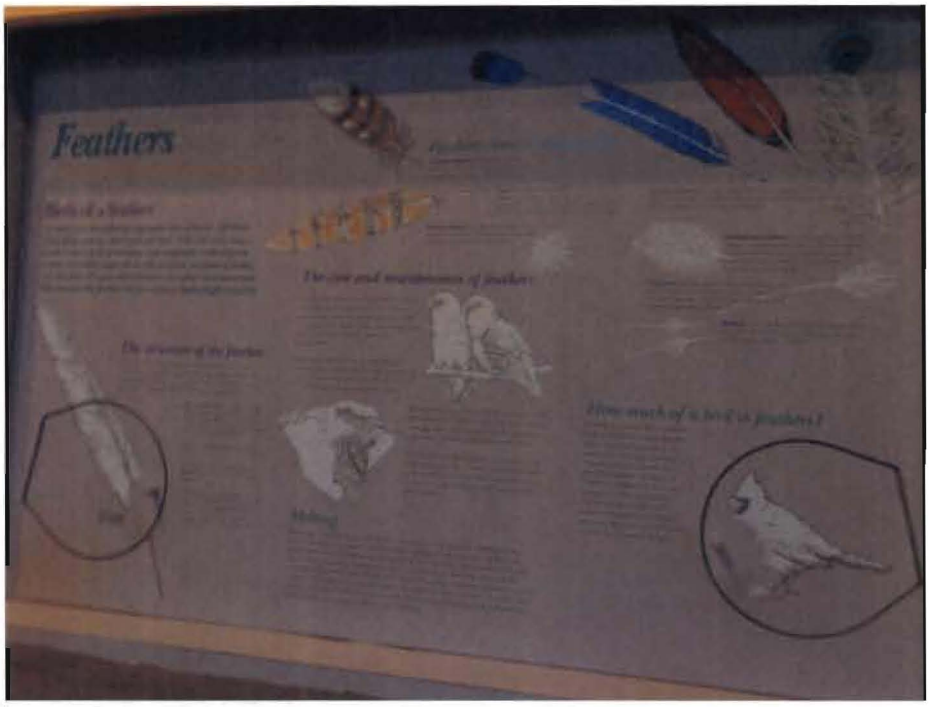


Figure 6a. Feather interpretative sign. Cincinnati Zoo.

Figure 6b. Beak interpretative sign. Toledo Zoo.

Figure 6c. Plant adaptation interpretative sign. Indianapolis Zoo.

Figure 7. Wolf comparison interpretative sign. Brookfield Zoo.

Figure 8a. Wolf behavioral interpretative sign. Brookfield Zoo.

Figure 8b. Zebra behavior interpretative sign. Fort Wayne Children's Zoo.

Figure 9. Food chain interpretive sign. Lincoln Park Zoo.

Figure 10a. Frog conservation interpretative signs. Brookfield Zoo.

Figure 10b. Conservation interpretative sign. Fort Wayne Children's Zoo.

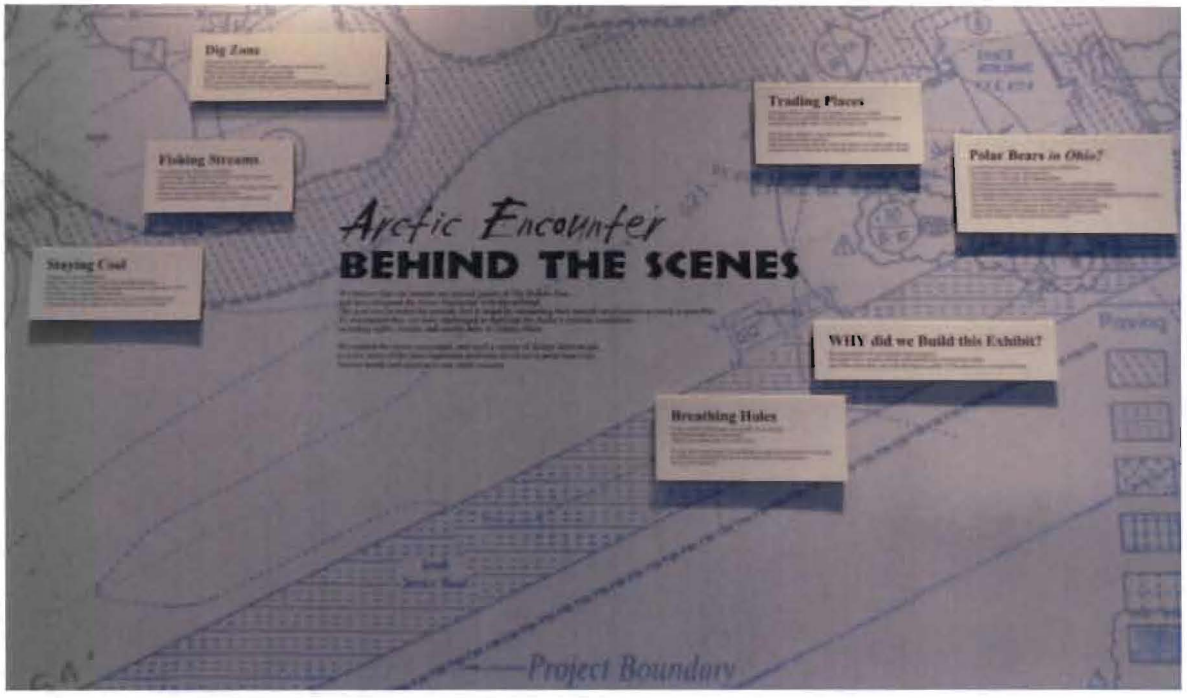


Figure 11a. Behind the scenes interpretative sign. Toledo Zoo.

Figure 11b. Enrichment interpretative sign. Brookfield Zoo.

Figure 12a. Culture interpretative sign. Toledo Zoo.

Figure 12b. Cultural interpretative sign. Toledo Zoo.

Figure 13a. Binturong ID sign. Detroit Zoo.

Figure 13b. Binturong ID sign. Detroit Zoo.

Figure 14a. Snake skull action interactive sign. Indianapolis Zoo.

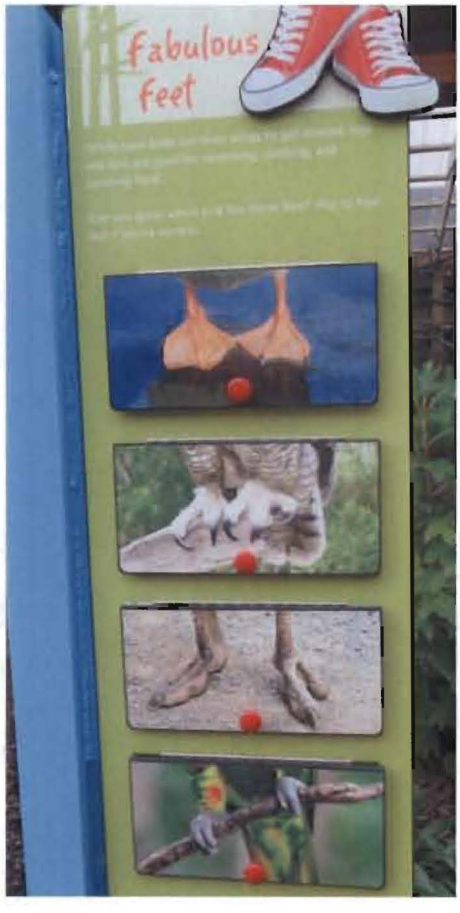


Figure 14b. Bird feet interactive sign. Indianapolis Zoo.

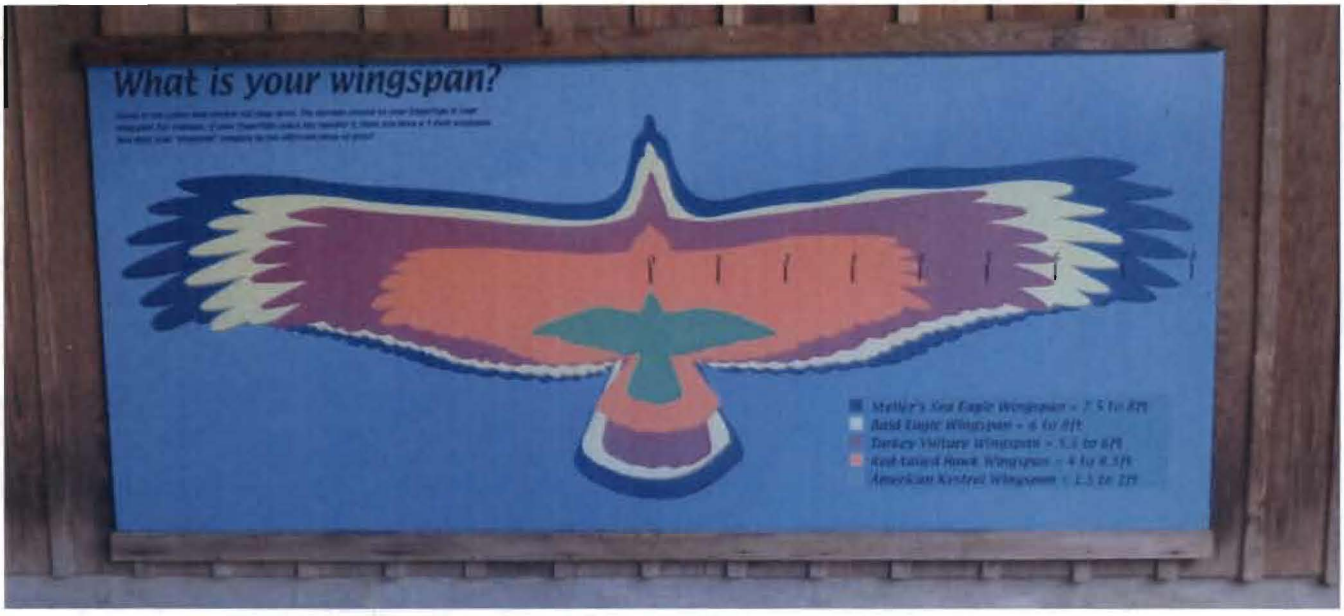


Figure 14c. Wingspan interactive sign. Cincinnati Zoo.

Figure 15a. Tiger ID and interpretative signs. Detroit Zoo.

Figure 15b. Tiger interpretative signs. Fort Wayne Children's Zoo.

Figure 16a. Poison frog ID signs. Brookfield Zoo.

Figure 16b. Bird ID signs. Brookfield Zoo.

Figure 16c. Aquarium ID signs. Brookfield Zoo.

Figure 16d. Polar bear interpretative sign. Brookfield Zoo.

Figure 16e. Giraffe interpretative signs. Brookfield Zoo.

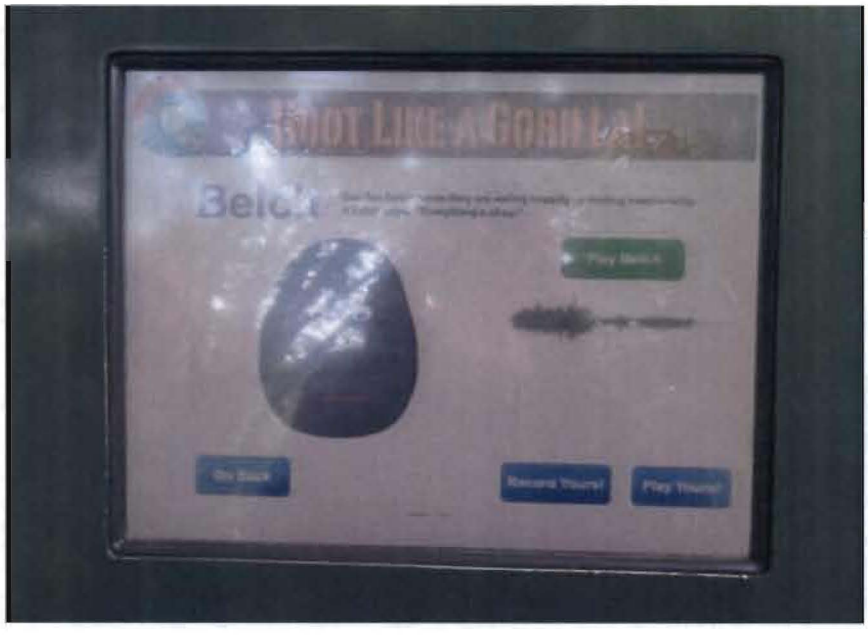


Figure 17a. Digital playback interactive sign. Cincinnati Zoo.

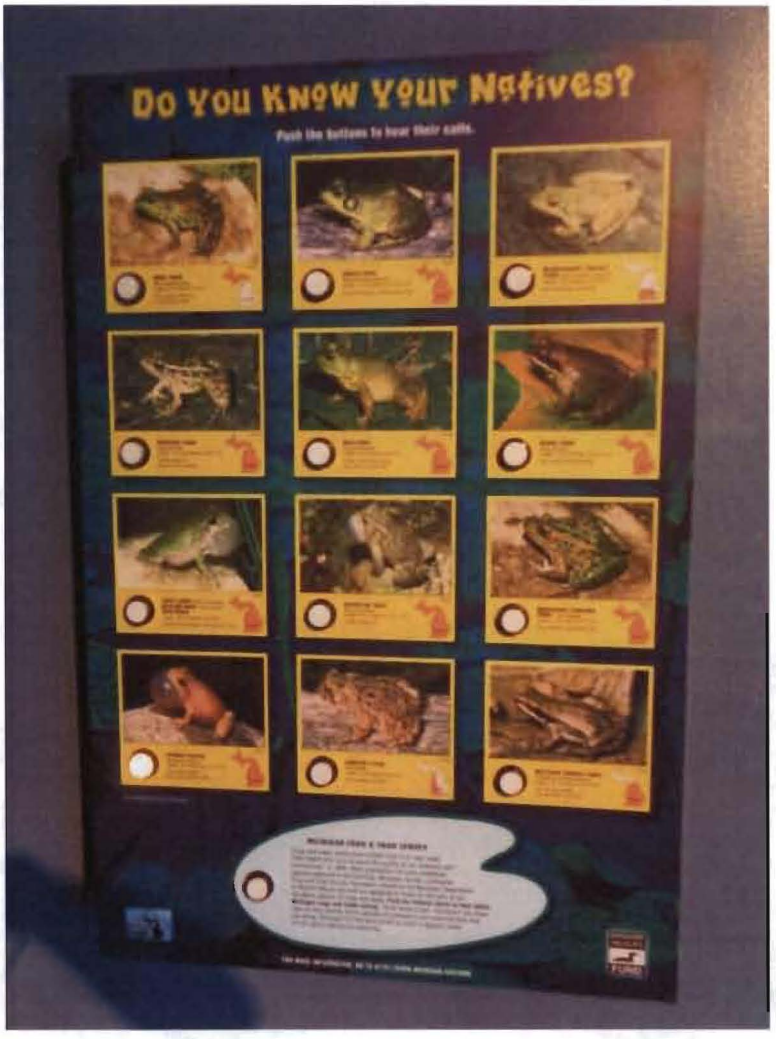


Figure 17b. Frog call interactive sign. Detroit Zoo.

Figure 17c. Ant interactive sign. Cincinnati Zoo.

Figure 18. Lion ID sign. Brookfield Zoo.

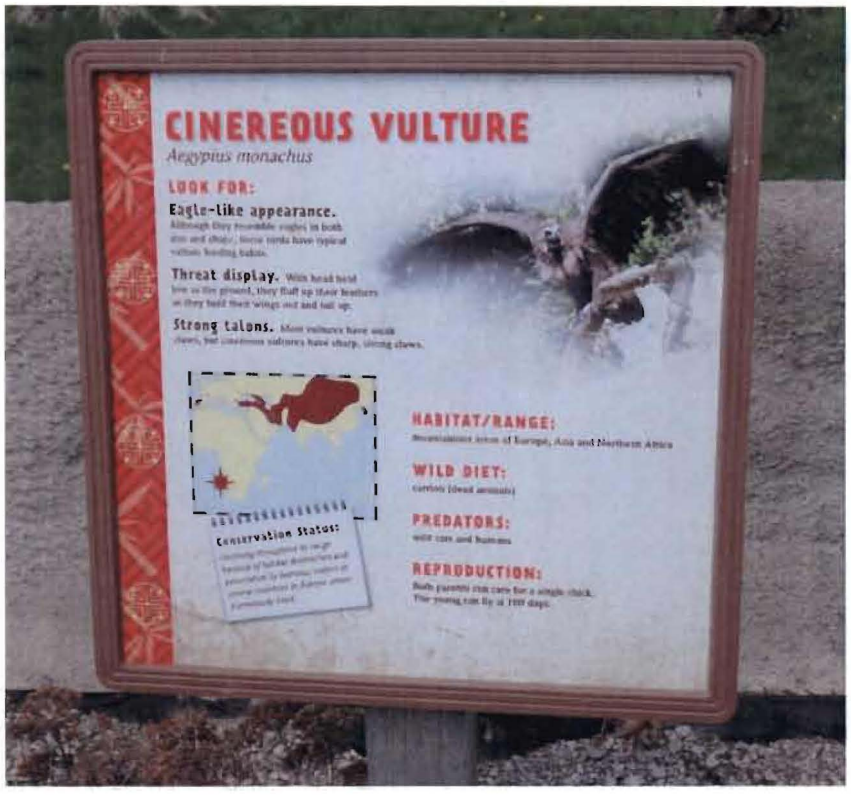


Figure 19a. Cinereous vulture ID sign. Detroit Zoo.

Figure 19b. Domestic Bactrian camel and fallow deer ID signs. Detroit Zoo.

Figure 19c. Honey badger ID sign. Fort Wayne Children's Zoo.

Figure 19d. Hyena interpretative sign. Fort Wayne Children's Zoo.

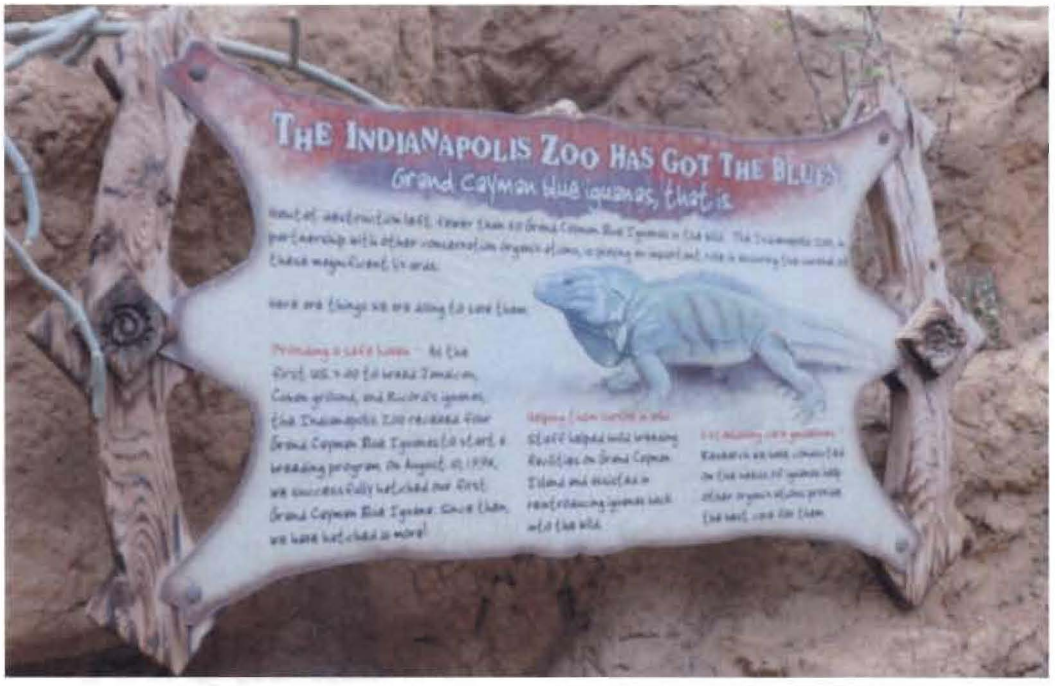


Figure 20. Grand Cayman blue iguana conservation interpretative sign. Indianapolis Zoo.

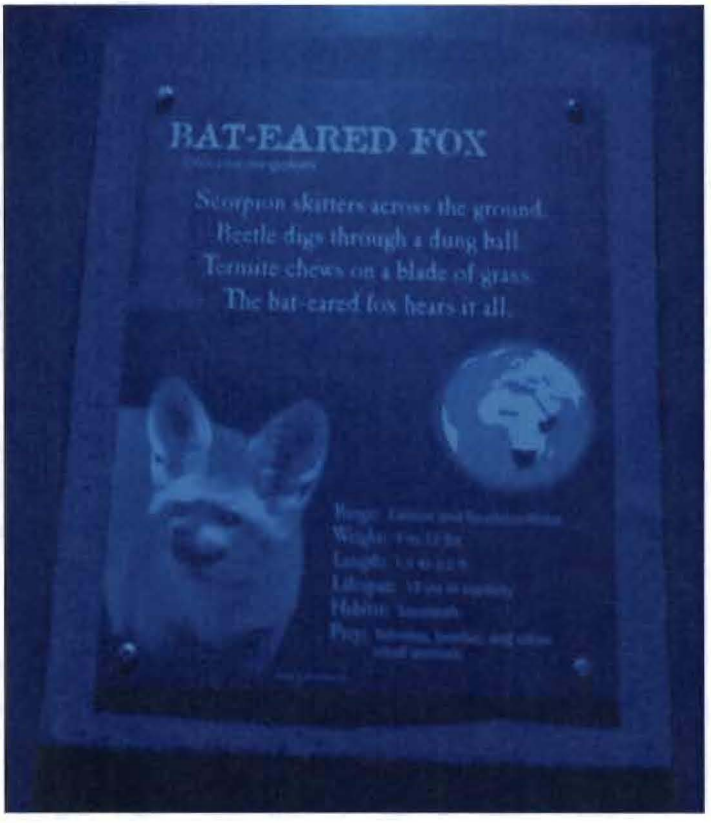


Figure 21a. Bat-eared fox sign. Cincinnati Zoo.

Figure 21b. Otter interpretative sign. Lincoln Park Zoo.

Figure 21c. Primate interpretative sign. Brookfield Zoo.

Figure 22a. Beaver interpretative sign. Detroit Zoo.

Figure 22b. Bird interpretative sign. Toledo Zoo.

Figure 23a. Cassowary ID sign. Brookfield Zoo.

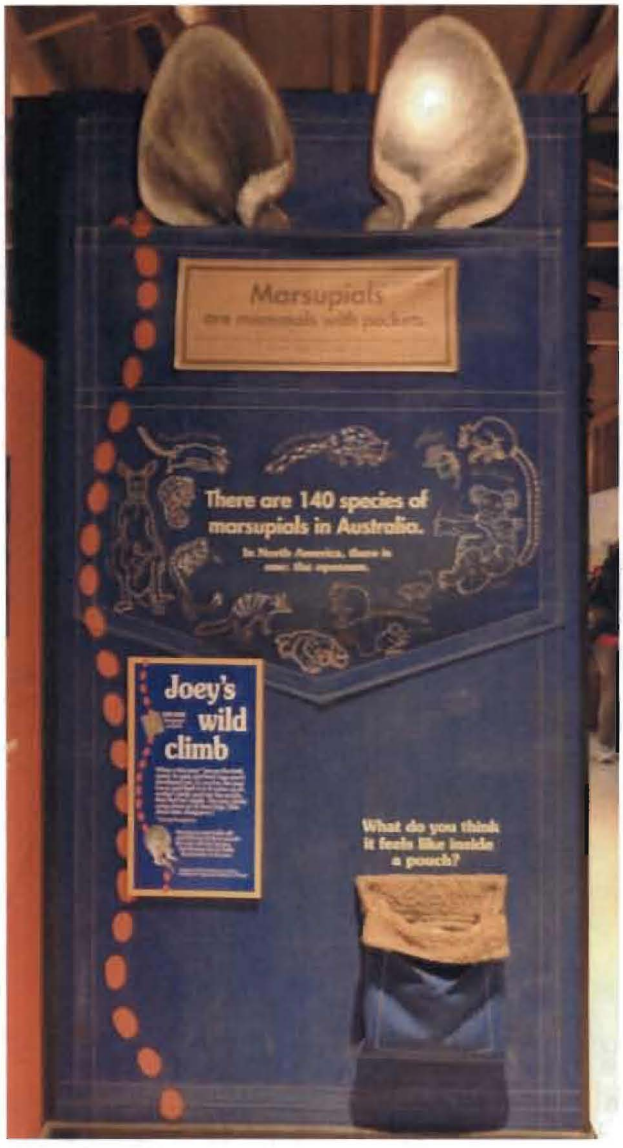
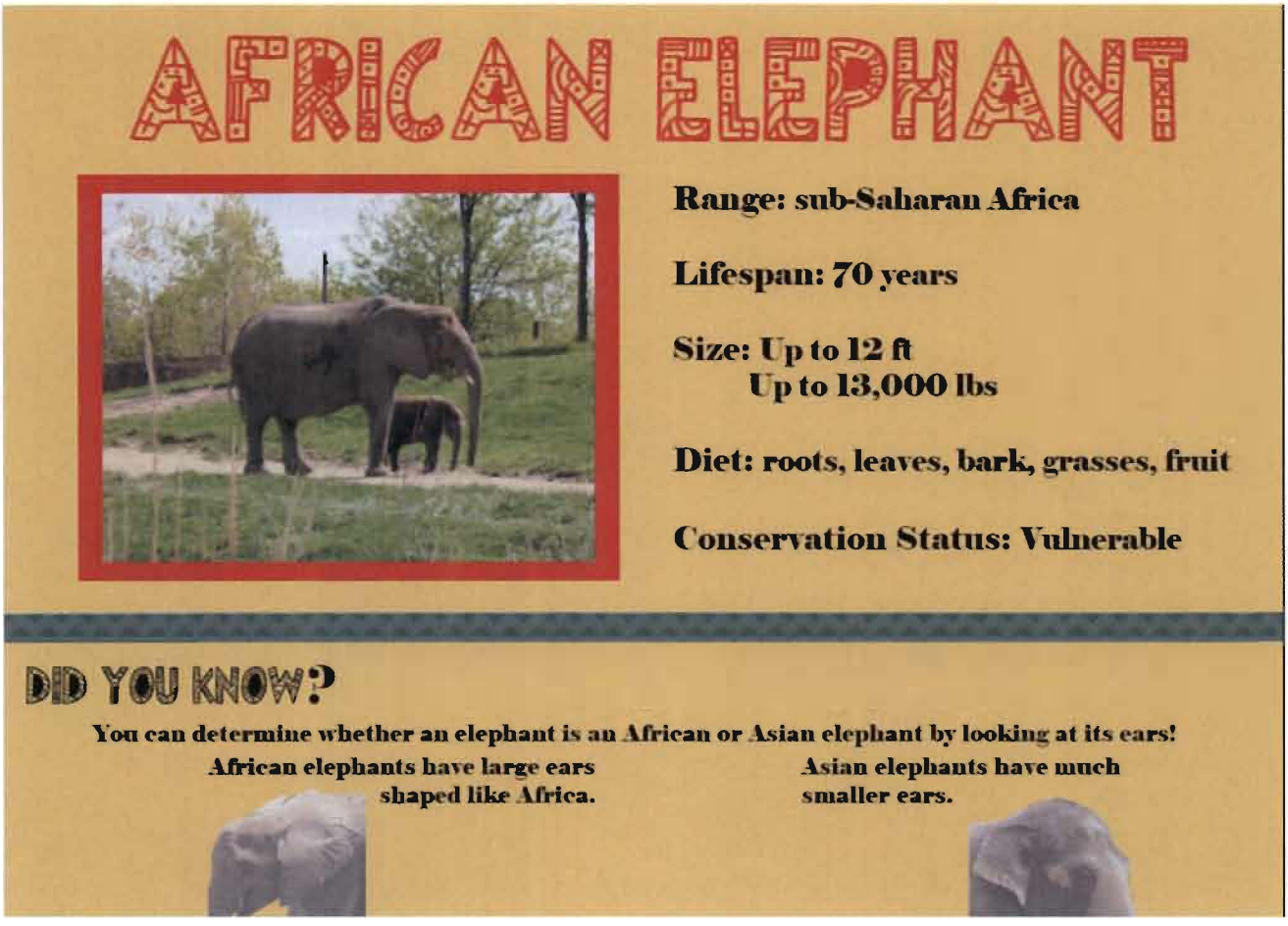


Figure 23b. Marsupial interpretative sign. Brookfield Zoo.

Figure 23c. Leopard ID sign. Fort Wayne Children's Zoo.



24a. African Elephant ID sign. Created by Elizabeth Curbey.

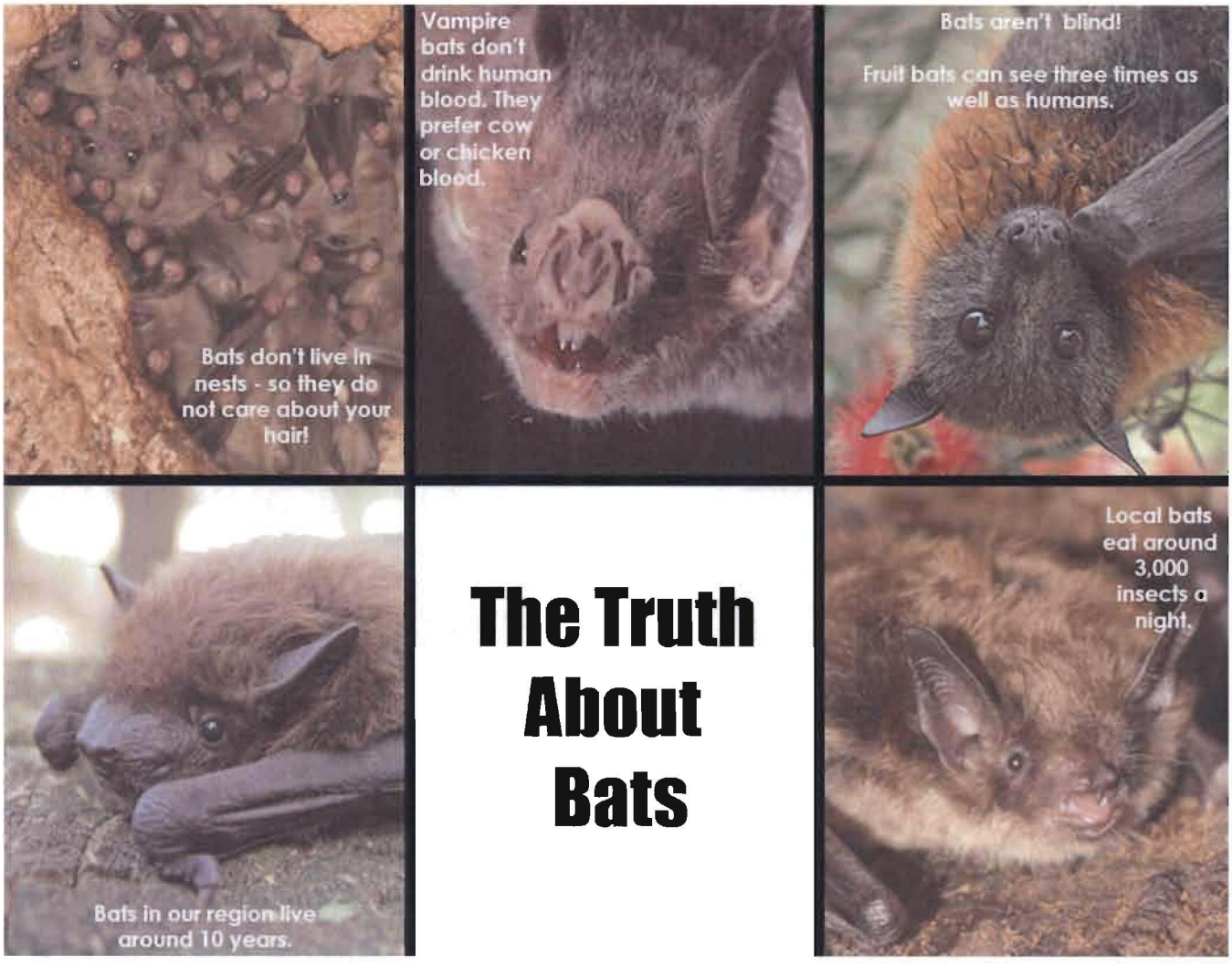
KOMODO DRAGON

"The world's largest lizard"

A KOMODO DRAGON'S SALIVA CAN KILL ITS PREY

Range: islands of Komodo, Flores, Rinca, and Padar
Lifespan: 50 years
Size: up to 10 ft long
up to 363 lbs
Diet: carrion, goats, pigs, other large prey
Conservation: Vulnerable

24b. Komodo Dragon ID sign. Created by Elizabeth Curbey.



24c. Bat interpretative sign. Created by Elizabeth Curbey.

24d. Ear interpretative sign. Created by Elizabeth Curbey.

Image Bibliography

Figures 1- 24a

All photographs taken by Elizabeth Curbey in the summer and fall of 2014.

Figure 24b

Komodo dragon range. Retrieved from http://animals.nationalgeographic.com/animals/reptiles/komodo-dragon/

Figure 24c

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Figure 24d

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